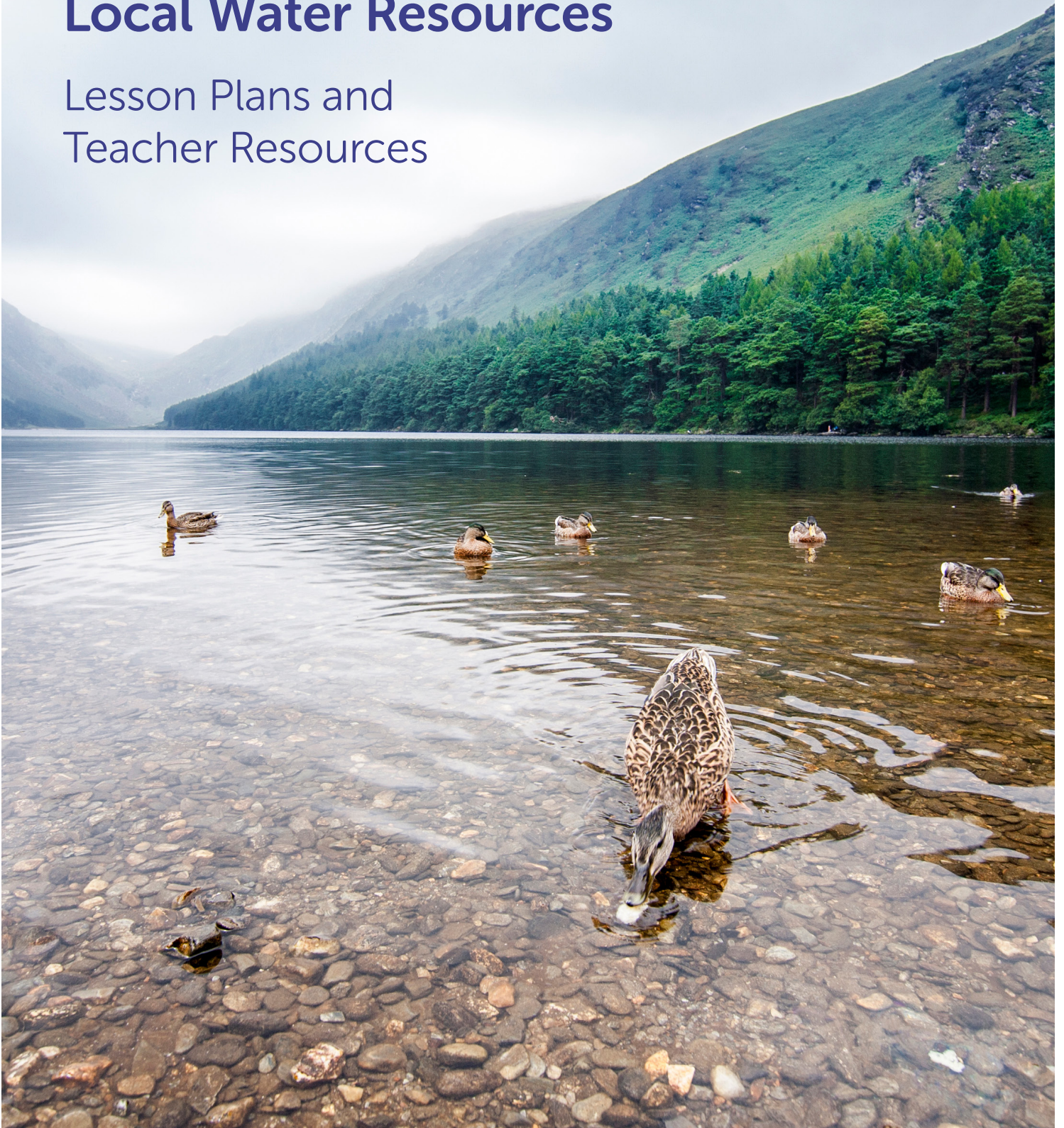




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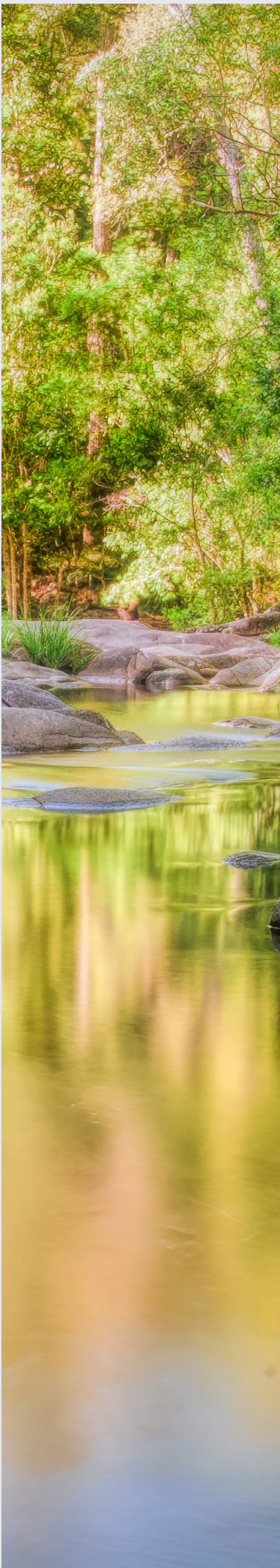
Using Digital Maps to Explore Local Water Resources

Lesson Plans and
Teacher Resources



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Introduction

This module introduces students to their local rivers and the concept of a river catchment, where their local water supply comes from and where their wastewater treatment plant is located. Students will learn how to use the EPA digital mapping tool available on the website www.catchments.ie

The website contains information on all of Ireland's waterbodies in a map database but also contains a great deal of information on Ireland's river catchments, water quality, pressures on water quality as well as details of measures that are being taken to improve water quality in Ireland. The students will use these online maps to identify local rivers, and key features such as towns, villages and their school.

These lessons will build on student's knowledge gained in subject areas such as Junior Cert Geography and Science. They will learn how to interrogate digital mapping data. The content covered will progress learning and capacity for Leaving Cert subjects such as Biology, Agricultural Science and Geography. The student directed activities provides an opportunity to develop a range of skills including map reading, finding information, research, digital presentation of information, communication and provides a good general understanding of water and wastewater services.

Module Structure

The module consists of 3 lesson plans and supporting resources in the form of PowerPoint presentations. Each lesson begins with an engagement activity, followed by more detailed exploration of the topic, includes student directed activities and a final opportunity to elaborate for further learning. All lessons have an associated student workbook and assessment activity.

Resource needs (internet etc)

Internet access is essential for most of the lessons in this module as online video resources are used. PowerPoint presentations for teachers can be downloaded in advance or accessed online. No prior knowledge of the topic is required.

Learning Outcomes

Students will be able to:

- 1 Use an online mapping database to identify local features and find out about water quality
- 2 Create a map showing their local river and catchment area
- 3 Understand the concepts of a river catchment, water source and water supply
- 4 Find out where their drinking water is sourced
- 5 Understand that when water is used it becomes wastewater
- 6 Know who is responsible for wastewater treatment
- 7 List the different stages and types of water treatment
- 8 Know some of the consequences of untreated wastewater
- 9 Find the local wastewater treatment plant
- 10 Know how to protect water through the correct disposal of items down a toilet or drain.

Lesson 1

Using digital maps to find your local river



Introduction & Engagement (5 Minutes)

Find out the students knowledge of their local rivers, lakes or coastal area and can they name any of the rivers in their county. Write their responses up on the board.



Exploration – Use Digital Maps to Find Your Local River (45 Minutes)

Slide 2 & 3 Ask students if they use maps and for what purpose. What type of maps do they use? Google, Atlas, Globe, Ordnance Survey Ireland?

Slide 4 Introduce students to the EPA website www.catchments.ie and with the help of Slide 5 (it is animated) explain the term catchments. A catchment is the area of land drained by a river, including the hills and mountains, from which surface and underground water flows into streams, rivers, wetlands, and eventually to the sea. In Ireland, there are 46 catchments areas, with 583 sub-catchments identified for management purposes.

Activity 1.1 Find your local river and other local features

Slide 6–13 Step-by-step instruction on finding your local river



This task can only be done a laptop of desktop computer.

The student workbook contains guidance for Activity 1.1, Steps 1- 5, ask the students to work in groups or individually to follow the workbook steps and identify and map their local river and sub-catchment on a computer. They will take a screen shot of the river catchment.



Elaboration

Activity 1.2 Drawing a map of your local river catchment

After students have created and saved a digital map of a local rivers and catchment, ask them to draw a sketch of the river and mark in the villages and towns found along the river.



Extension / Homework

Ask students to talk their family members and neighbours about their local river and what has it been used for in the past.

Ask the students to mark on their sketched map areas of interest, e.g. nature spotting, hanging out locations, swimming, kayaking, fishing access points, bridges, mills etc.



Assessment Student Workbook Lesson 1

- Students will locate and name their local rivers.
- Save a digital map of their local area with the local river names highlighted.
- A sketched map of their local river, towns and villages.



Additional resources

Click on a catchment to find out more Data

Lesson 1

Direct link to the powerpoint

Lesson title: Schools Water Module: Digital Maps, Lesson 1 - Find your local water resource

www.thewaterforum.ie/resources-category/education-resources/

Using digital maps to explore water resources

Lesson 1 - Finding your local river

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1

Maps

Maps inform us about our surroundings.

- Different colours, symbols and lines represent environmental features, e.g. rivers, mountains, towns, roads, boundaries, etc.
- From a measuring scale and a compass orientation we can figure out the size, distance and direction of features from a specific point.
- A map legend will tell us what different symbols mean.

2

Digital Maps

Nearly all modern mobile phones have a map applications that we use daily.

Google Maps

or

Apple Map

From reading a map we can extract information that allows us to visualize what things on the ground look like, the distances between different points and the location and size of a feature.

3

epa Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshlua

www.catchments.ie is a free online mapping resources provided by the EPA that provides information on rivers, lakes, and coastal areas across Ireland.

catchments.ie

In this lesson you are going to use the EPA maps to find your local river.

4

What is a Catchment?

- A catchment is the area of land, including the hills and mountains, from which surface and underground water flows into streams, rivers and wetlands, and eventually to the sea.
- In Ireland, 46 catchments composed of 583 sub-catchments are identified for management purposes.

Source: <https://gis.epa.ie/EPAMaps/Water>

5

Task 1.1 Find your local river

Log on to <https://www.catchments.ie> and click on **Maps**

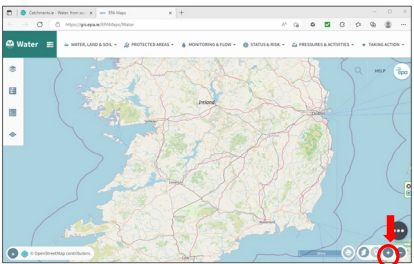
Welcome to Catchments.ie - Water from source to sea.

Get involved
Sign up to get water news emailed to you

First name Surname
Email County

6

7



- Using the '+' button on the screen, or with a mouse scroll wheel, zoom into your county.
- Locate your school on the map by left clicking, holding down the mouse and dragging your target area to the centre of the screen.

8

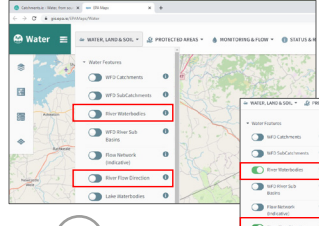
Digital Maps Have Layers

- Digital maps have different layers to show different features
- We are going to turn on two layers of the map to see our local rivers.

Click on **WATER, LAND & SOIL**

Select **River Waterbodies** and **River Flow Direction** by sliding the button across.

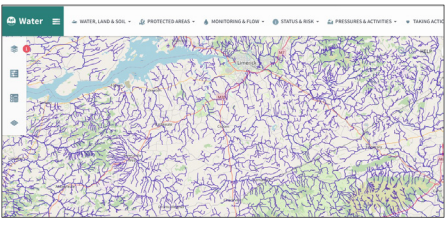
The buttons will turn green



9

Your screen will now look like below.

All the purple lines represent all the streams and rivers in Ireland.



Use your mouse to scroll in and out for different magnifications to see more or less detail.

10

Find the rivers and streams in your area

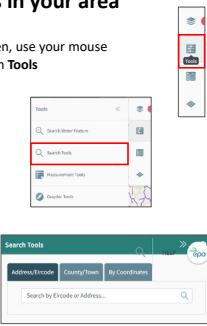
- Go to the icons on the far left of the screen, use your mouse to hover over the second icon and click on **Tools**

A **Tools** pop-up will appear

- Select "Search Tools"

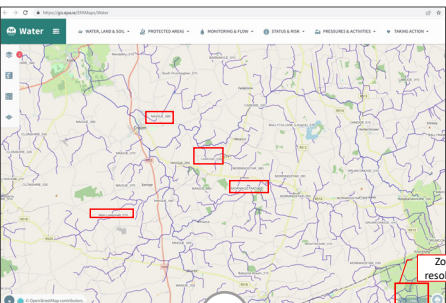
A **Search Tools** pop-up will appear

- Enter the school address or eircode



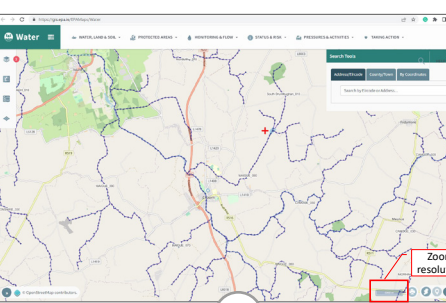
11

Zoom in and out to view different details. A zoom resolution of 2 km or less will show the river names. Note the rivers



12

Zoom in and out to view different levels of details. 1000m or less will show the river flow direction.



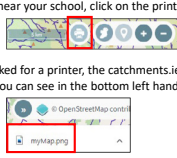
13

Save your map of local rivers

- To save the map of the rivers near your school, click on the printer icon in the bottom right hand corner.

Don't worry, you will not be asked for a printer, the catchments.ie app will create a myMap.png file that you can see in the bottom left hand corner of the screen.

If you are using a Windows operating system, the file will probably automatically save to the Downloads folder. You will need this map for your final project.



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Task 1.2

Draw a map of your local river in your workbook

- 1st identify on the map the river source (also called the headwater) or the starting point location of the river.
- 2nd identify on the map where the river enters the sea or joins a larger river (it is then a sub-catchment).
- Draw the course of the river in your workbook and mark in the villages and towns the river passes through.
- Mark in other features, e.g. old mills, water amenities, bridges, etc. Be creative!
- Aim to create a map that tells the reader what they can expect to see along the river.

Lesson 2

Using digital maps to find your water source



Lesson Introduction and Engagement (5 Minutes)

Ask students where the water in their taps comes from? Do they know who supplies their water? Who is responsible for water supply?



Exploration - Where Does Your Water Come From? (45 Minutes)

Slide 2 & 3. Uisce Éireann is the public body with responsibility for supplying drinking water and wastewater services in Ireland. They provide drinking water to 4.2 million people, 87% of the population. Each day, they provide 1.7 billion litres of drinking water from nearly 539 water supply zones, treated at 749 water treatment plants and distributed through 65,000km of pipelines. Irish Water provide a great deal of information about what they do on their website www.water.ie and education material on how they source and process drinking water in Ireland and this information will form the basis of this lesson.

In many rural areas, drinking water is often supplied by local groups known as Group Water Schemes or from private wells.

Slide 4. Water Supply. Approximately 80% of Ireland's drinking water is sourced in rivers and lakes, treated and pumped to homes across the country. The untreated water is known as raw water and the process of treatment including screening to remove twigs and other materials, filtering to further clear debris and disinfecting to remove pathogens and bacteria, prior to testing before it leaves the plant. This process can take a number of days and all drinking water needs to reach a health standard prior to distribution.

Go to: www.water.ie/help/supply/cloud-to-glass to Irish Water's interactive website and follow the water supply and treatment process with the students or Click on the short YouTube clip **(10 min)**

Activity 2.1 Record the stages of water treatment

- Ask student to list the stages of water treatment in their workbook.

Slide 5. In rural areas water can be provided by private group water supply schemes. Most groups are members of the National Federation of Group Water Schemes. The Slide 5 map gives an idea of where and how many exist across the country.

Slide 6. If there is time (5:30min), play the Irish Water YouTube video to find out how Ireland's largest public water treatment plant in Kildare works:
<https://www.youtube.com/watch?v=iYFwFRWOEho>

Activity 2.2 Find your school water supply

- Use the digital mapping tool to locate your school water supply zone

Slide 7 & 8 and Using any device connected to the internet you and students can find your school's water supply zone by following the steps on the slide or in the Student Workbook



Elaboration - Suggested Discussion Activity 2.3 Classroom Discussion (15min)

Ask student to discuss the following topics in groups:

1 What do you use drinking water for at home?

- a) Is this a good use of treated water (expensive)
- b) What are the alternatives to piped drinking water for non-human ingestion uses?

2 Should people be charged for water?

- a) What are the advantages and disadvantages of water charges?

3 What level of water treatment is necessary?

Talk to the students about why water needs to be treated before we drink it. Many of the improvements in public health over the past 150 years are because of improvements in water treatment.



Extension / Homework

Encourage students to ask at home where their drinking supply comes from. Students can find their home drinking water source using the steps in their workbook.



Assessment - Student Workbook Lesson 2

- Students will define the concepts of water source and water supply
- Students will have listed the stages of water treatment
- Students should list the advantages and disadvantages of paying for water
- Students will have identified their water supply for their school and home



Additional resources

[From Cloud to Glass | The Journey of Water | Irish Water](#)
Interactive webpage

The Story of Water
<https://youtu.be/aydrk3cK7o8> (1min)

How Ireland's largest public water treatment plant in Kildare works:

<https://www.youtube.com/watch?v=iYFwFRW0Eho>
(5:30min) (optional)



Lesson 2

Direct link to the powerpoint

Lesson title: Schools Water Module: Digital Maps, Lesson 2 - Water supply and treatment

www.thewaterforum.ie/resources-category/education-resources/

Using digital maps to explore water resources

Lesson 2 – Where is your water source and supply treated?

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1

Water Supply

Public water supply – Uisce Éireann Irish Water

- Irish Water provides public water for 87% population.
- 80% of water is sourced in lakes and rivers
- 750 water treatment plants and 65000km of distribution pipes

Group Water Schemes are privately owned and operated schemes in communities in rural areas

Private wells are wells on privately owned land for individuals and their family.

2

Irish Water Source, Treat and Supply Public Drinking Water

Source

Water Treatment Plant

Demand

Uisce Éireann

3

Task 2.1 How Water is Treated

RAIN WATER is part of the life cycle of water. It falls to the ground and soaks into the soil, or runs off into lakes, rivers and seas.

The RAW water must be cleaned and filtered before becoming SAFE drinking water.

20% groundwater & springs

80% lakes & rivers

Go to: www.water.ie/help/supply/cloud-to-glass to find out how water is treated.

YouTube – The Story of Water <https://youtu.be/avdrk3ck7o8> (1min)

Uisce Éireann

4

Ireland's Group Water Schemes

Tory Island

National Federation of Group Water Schemes

Source type

- surfacewater
- groundwater
- mixed

Connections

- 100
- 1000

Source: <https://nfgws.ie/wp-content/uploads/2020/07/gws-map.html>

5

EXTENSION ACTIVITY

Ballymore Eustace – Ireland's Largest Treatment Plant

UISCE ÉIREANN - IRISH WATER

The water treatment process

<https://www.youtube.com/watch?v=iYFwFRWOEh0> (5:29min)

6

Task 2.2

Finding Your School Water Supply Zone

Go to <https://www.water.ie/help/water-quality/> and Check your water quality by entering your school Eircode or address.

Uisce Éireann

7

Finding Your School Water Supply Zone... contd.

Sample Answer.

Check your water quality

Enter an Eircode or an address to see the latest water quality report for the water supply zone it's located in.

✓ Kilfinnane, Co. Limerick, V35 YH27, Ireland

The water supply zone for **Kilfinnane, Co. Limerick, V35 YH27, Ireland** is KilfinnaneArdpatrick Water Supply . Here is the latest water quality report for that area. These results are not real-time. Click on "View all detailed test results for this area" for further information on these results and to check if your water supply has a boil water notice or a do not consume notice in place.

8

Task 2.3

CLASS DISCUSSION

1. What do you use drinking water for at home?
 - a) Is this a good use of treated water (expensive)?
 - b) What are the alternatives to piped drinking water for non-human consumption?
2. Should people pay for water?
 - a) What are the advantages and disadvantages of water charges?

9



Lesson 3

Using digital maps to find your local wastewater treatment plant



Introduction & Engagement (5 Minutes)

We suggest starting the conversation by asking the students what do they understand by the term wastewater, i.e. what is found in wastewater? Do students know what happens to water once it flushed away. This lesson aims to provide some of the answers.



Exploration – Water Treatment (45 Minutes)

Slide 3. Uisce Éireann is the public body with responsibility for wastewater collection and treatment.

Slide 4. Explains the necessity to treat wastewater.

Slide 5. Go to: <https://www.water.ie/help/wastewater/treatment/from-drain-to-sea/> to follow how wastewater is treated. The YouTube video gives a quick explanation – The Story of Wastewater <https://youtu.be/Ae5TqNalfxM> (1:22min)

Slide 6. Explains the difference between different types of wastewater treatment.

Activity 3.1 Find your local wastewater treatment plant

- Use digital maps to find your local treatment plant

Slide 7-9. Ask student to find their local wastewater treatment plant by following the steps in their workbooks OR using the presentation slides. (p.12 of workbook)

Slide 10-12 Ask students what should be flushed down a toilet? Only the 3- Ps: Pee, Poo and (toilet) Paper.

The videos from Clean Coast and Uisce Éireann explain what everyone needs to do to keep wastewater systems working efficiently. <https://thinkbeforeyouflush.org/> for the toilet

Think before you pour
<https://www.water.ie/help/blockages/think-before-you-pour/>



Elaboration Activity 3.2 Classroom Discussion (10min)

Ask student to do an internet search on a “Fatberg” and ask them to share their findings with class. How can they help prevent fatbergs?



Assessment Student Workbook Lesson 3

- Students have a note of the steps used in wastewater treatment
- Students will have identified their local wastewater treatment plant
- Students will have downloaded a compliance report for the treatment plant
- Students will have identified how to reduce their impact on wastewater systems.



Additional Resources

Irish Water / Uisce Eireann
[Wastewater - From Drain To Sea | Irish Water](https://www.water.ie/help/wastewater/treatment/from-drain-to-sea/)

www.water.ie/help/wastewater/treatment/drain-to-sea

[EPA Urban Wastewater Treatment Report](#)

[EPA National Domestic Wastewater Treatment Inspection Plan](#)

The Story of Wastewater
<https://youtu.be/Ae5TqNalfxM>

<https://gis.epa.ie/EPAMaps/SewageTreatment>

<https://thinkbeforeyouflush.org/>

<https://youtu.be/X2bPRvgrBKw>

Lesson 3

Direct link to the powerpoint

Lesson title: Schools Water Module: Digital Maps,
Lesson 3 - Wastewater treatment

www.thewaterforum.ie/resources-category/education-resources/

Using digital maps to explore local water resources

Lesson 3 – Wastewater and wastewater treatment

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1

What is wastewater?

- After we use drinking water we flush it down a sink or toilet.
- Once used, drinking water becomes wastewater.
- Wastewater can be sewage or non-sewage.
 - Sewage contains urine and faeces
 - Non-sewage is wastewater that doesn't contain urine and faeces
- Public sewers carry wastewater from homes and businesses to treatment plants.

2

Public water treatment

- Uisce Éireann (Irish Water) is the public utility responsible for wastewater collection and treatment.
- There are 26,000 kilometers of sewage pipes pumping wastewater to over 1000 plants for treatment.
- The treated wastewater is then pumped back to our rivers, lakes, estuaries and coastal areas.

3

Why do we need to treat wastewater?

- Human waste, detergents, medicines and other products found in wastewater are pollutants and threaten public health as well as damage the wildlife that live in the rivers and lakes.
- Wastewater can contain bacteria and viruses that can cause illness such as diarrhoea, dysentery, typhoid fever and *E. coli* infection.
- Wastewater needs to be treated to prevent illness and environmental pollution.

4

Public Wastewater Treatment

From drain to sea

Wastewater from your home comes from human waste, soap and detergents. It goes through many stages before it is clean and safe to discharge into the sea, rivers or lakes.

Click the video to begin

WATCH VIDEO

5

Go to: <https://www.water.ie/help/wastewater/treatment/from-drain-to-sea/> to find out how wastewater is treated.

YouTube – The Story of Wastewater <https://youtu.be/Ae5TqNalfxM> (1:22min)

Uisce Éireann Irish Water

What is the difference between Preliminary, Primary, Secondary and Tertiary wastewater treatment?

- **Preliminary** – Removal of rags, large plastic, grit and fat.
- **Primary** – Water is passed through sedimentation tanks to remove the solids in settlement tanks, the sludge is removed and the separated water is piped out for further treatment if available (it should be).
- **Secondary** – Using biological processes, i.e., micro-organisms breakdown the remaining organic waste (pollutants). The water is then piped to another settlement tank.
- **Tertiary / Nutrient Removal** – The wastewater treatment plants treat the water again and remove more nutrients, nitrogen and/or phosphorus, before the water is tested and released into a river or sea.

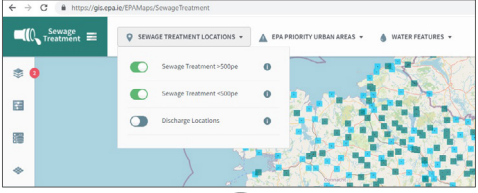
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Source: EPA

Task 3.1

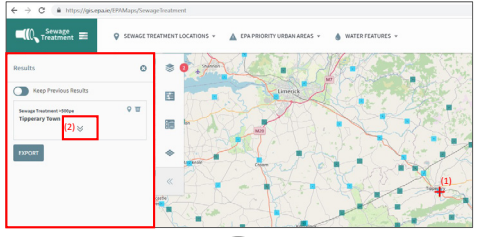
Find your local wastewater treatment plant

- Go to: <https://gis.epa.ie/EPAMaps/SewageTreatment>
- Click on Sewage Treatment Locations
- Turn on the Sewage Treatment >500pe & <500pe options (see below)



7

- Zoom in to your county to see the location of treatment plants
- Click on a local treatment plant, e.g. (1)
- A red cross will appear, and a Results panel will appear on the left.
- Click on the down arrows (2) for a report.



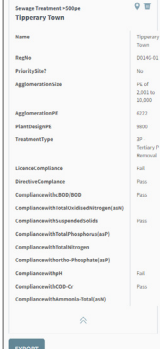
8

- A brief report (similar to the left) will appear.
- There is a lot of information here that you can investigate further.

Key information:

- Treatment Type
- Licence Compliance
- Directive Compliance

- You can choose to export the report to save for later.



9


What can you do to reduce your impact on wastewater?

Find out from the following videos


10

Think before you flush

Video from Clean Coasts



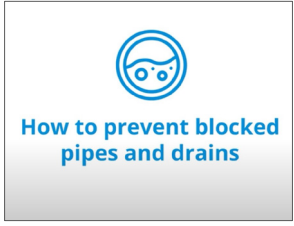
<https://youtu.be/SuNIFGJAhcI> (1:10min)



11

Think before you pour & flush


Video from Irish Water



How to prevent blocked pipes and drains

Fats, oil and grease can cause major blockages in pipes and Sewer

<https://youtu.be/X2bPRvgrBKw> (30sec)



12

Task 3.2

- Do an internet search to find out about "fatbergs"
- How can we help prevent fatbergs and blockages?

13



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